

REMARKS

Claims 1 and 14 have been amended. Claim 24 has been cancelled. Claims 1-23 and 25 remain for further consideration. No new matter has been added.

The objections and rejections shall be taken up in the order presented in the Official Action.

8-10. Claims 1-7, 14-17 and 24 currently stand rejected under 35 U.S.C. §103(a) for allegedly being unpatentable over U.S. Patent App. No. 2003/0003347 to D'Arrigo et al. (hereinafter "D'Arrigo") in view of U.S. Patent App. No. 2002/0098399 to Keppeler (hereinafter "Keppeler").

CLAIM 1

As amended claim 1 recites an integrated fuel cell and integrated circuit device which includes the features of:

"a reservoir containing fuel on a side of the first electrode; and
a reactant delivery device configured to provide a reactant, where the reactant reacts with protons from the fuel to generate current, the reactant delivery device positioned on the side of the second electrode;
where the fuel is integrated into the material of at least one of the first electrode and an adjacent layer." (cl. 1, emphasis added).

The Official Action contends that D'Arrigo teaches each feature recited in claim 1 except that "*fuel is integrated into the material of at least one of the first electrode and an adjacent layer; or, that hydrogen is integrated into fuel delivery device as fuel.*" (Official Action "OA", pg 3).

The Action further contends that Keppeler teaches these features and that it would have been obvious to one of ordinary skill in the art to have incorporated a fuel storage material into the first electrode of the fuel cell in D'Arrigo. (OA, pg 3-4). The Applicant respectfully disagrees.

A PERSON OF ORDINARY SKILL WOULD NOT COMBINE D'ARRIGO AND KEPPELER

A person of ordinary skill in the art would not be motivated to combine the teachings of D'Arrigo and Keppeler for several reasons. First, D'Arrigo teaches a micro silicon fuel cell that is integrated in a semiconductor device. (see D'Arrigo, 'Title' and paragraph [0001]). Thus, according to a fair and proper reading, D'Arrigo teaches fuel cell on a micro scale. In contrast, Keppeler teaches "*a fuel cell system which ensures a sufficient energy supply at peak loads, particularly for a vehicle drive.*" (Keppeler, [0010]). In fact, Keppeler references, explicitly and implicitly, using the disclosed fuel cell for operation in a motor vehicle in numerous passages, and does NOT specifically disclose other uses thereof. (see Keppeler, paragraphs [0005]-[0006], [0008]-[0010], [0014], [0016], [0024], [0029], [0031]-[0032]). Thus, according to a fair and proper reading, Keppeler merely discloses a fuel cell for use with a motor vehicle (e.g. a battery for a motor vehicle). (see Keppeler, paragraph [0014]). That is, Keppeler teaches a fuel cell on a macro scale (e.g. a battery for a vehicle).

The Action contends that the reference in Keppeler to a vehicle is merely an exemplary embodiment, and does not limit the applications of the fuel cell. (OA, pg 13). However, according to the court in *In re Wesslau*, "*it is impermissible within the framework of section 103 to pick and choose from any one reference only as much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art.*" (353 F.2d 238, 241 (CCPA 1964)). Accordingly, assuming, without admitting, that the fuel cell taught in Keppeler could be adapted for other uses other than, for example, a battery for a motor vehicle, there is still no teaching or suggestion that it could be used on a micro scale as taught in D'Arrigo.

Second, the device of D'Arrigo discloses that the fuel is not contained within the package of the integrated circuit, but rather is received from a source external to the packaged integrated circuit via a hydrogen inlet when the fuel cell is operated. Specifically, as illustrated in FIG. 15 of D'Arrigo, reproduced below in the interest of convenience, the fuel is provided by the hydrogen inlet.

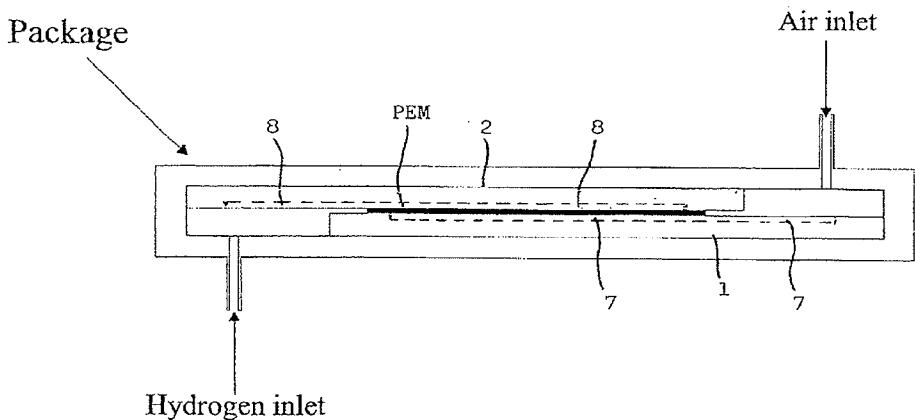


FIG. 15

Therefore, if a person of ordinary skill in the art at the time of the invention was to amend D'Arrigo as suggested in the Official Action, then the resultant device would no longer receive fuel from a source external to the integrated circuit as required by D'Arrigo. Specifically, D'Arrigo states “[s]everal of the integrated channels 8 of the negative half-cell extend beyond the opposite edge of the PEM membrane and communicate with an inlet chamber of the fuel gas, such as a hydrogen, for example.” (emphasis added, [0057]). So if D'Arrigo was modified as suggested in the Official Action, D'Arrigo would no longer receive external fuel, which is so clearly required by the teachings of D'Arrigo.

In summary, a person of ordinary skill in the art would NOT have been motivated to combine the teachings of D'Arrigo with those in Keppeler, as the fuel cell in D'Arrigo is used on the micro scale, whereas the fuel cell in Keppeler is used on a macro scale (e.g. as a battery for a vehicle, etc.). In addition, if the references were combined as suggested in the Official Action then D'Arrigo would no longer work for its intended purpose.

**THE COMBINED TEACHINGS OF D'ARRIGO AND KEPPELER
DO NOT TEACH THE FEATURES RECITED IN CLAIM 1**

Assuming, without admitting, that the teachings from D'Arrigo and Keppeler were combined, the combination would still not teach or suggest the features recited in claim 1. Specifically, the combination of D'Arrigo and Keppeler fails to teach or suggest the features of:

“a reservoir containing fuel on a side of the first electrode; and
a reactant delivery device configured to provide a reactant, where the reactant reacts with protons from the fuel to generate current, the reactant delivery device positioned on the side of the second electrode;
where the fuel is integrated into the material of at least one of the first electrode and an adjacent layer.” (emphasis added, cl. 1).

First, D'Arrigo teaches that the fuel cell includes a hydrogen inlet and an air inlet to the package of the integrated circuit (see FIG. 15 reproduced above in the interest of convenience). In addition, Keppeler also clearly discloses a fuel inlet pipe 5 as shown in the sole FIGURE. Keppeler states “[t]he feeding pipe provides fuel [...] to the anode space 2,...”. [0023]. So even if a person of ordinary skill was to modify D'Arrigo based upon the teachings of Keppeler, the resultant system would still receive fuel from an external source via an inflow line. Significantly, the combined references fail to disclose or suggest the claimed features of “*a reservoir containing fuel on a side of the first electrode*” and “*where the fuel is integrated into the material of at least one of the first electrode and an adjacent layer.*” (emphasis added, cl. 1).

CLAIM 14

As amended, claim 14 recites an integrated fuel cell and integrated circuit device that includes:

“a fuel cell, located on the semiconductor substrate and comprising
 a first electrode and a second electrode configured to define a reaction region, where one of the first and the second electrodes is a cathode and the other is an anode;
 a catalytic layer that is permeable at least to protons and is configured to permit catalytic activity, the layer positioned between the first electrode and the second electrode;
 a reservoir containing fuel on a side of the first electrode; and
 a reactant delivery device configured to provide a reactant, where the reactant reacts with protons from the fuel to generate current, the reactant delivery positioned on the side of the second electrode;
 where the reactant for generating a quantity of current is integrated into the material of at least one of the second electrode and an adjacent layer, and the fuel is integrated into the first electrode;
 where only reactant from the reservoir can react with the fuel.” (emphasis added, cl. 14).

As set forth above regarding claim 1, the combination of D’Arrigo and Keppeler fails to suggest the features that a fuel reservoir is located on a side of the first electrode, and the fuel is integrated into the first electrode. In addition, claim 14 recites the additional feature that only reactant from the reservoir can react with the fuel. Again, D’Arrigo and Keppeler both teach receiving fuel from external devices via inlets. Specifically, as illustrated in FIG. 15 of D’Arrigo, the device disclosed in D’Arrigo includes a hydrogen inlet for providing fuel. Similarly, the FIGURE of Keppeler discloses a feeding pipe 5 for providing fuel. So even if these references were to be combined, the resultant teachings would still fail to disclose or suggest a reservoir containing fuel, where the fuel is integrated into the first electrode and only reactant from the reservoir can react with the fuel. Therefore, it is respectfully submitted that the combined references are incapable of supporting an obviousness rejection.

CLAIMS 2-7 AND 15-17

It is respectfully submitted that these rejections are moot since claims 1 and 14 from which claims 2-7 and 15-17 depend are patentable for at least the reasons as set forth above.

CLAIM 24

Claim 24 has been cancelled.

11. Claims 8-10 and 18-20 currently stand rejected under 35 U.S.C. §103(a) for allegedly being unpatentable over D'Arrigo and Keppeler in view of U.S. Patent No. 3,338,746 to Plust et al. (hereinafter "Plust").

It is respectfully submitted that these rejections are moot since claims 1 and 14 from which claims 8-10 and 18-20 depend are patentable for at least the reasons as set forth above.

12. Claim 11 and 21 currently stands rejected under 35 U.S.C. §103(a) for allegedly being unpatentable over D'Arrigo, Keppeler and Plust in view of U.S. Patent App. No. 2002/0168560 to Murkerjee et al. (hereinafter "Murkerjee").

It is respectfully submitted that these rejections are moot since claims 1 and 14 from which claims 11 and 21 depend are patentable for at least the reasons as set forth above.

13. Claim 12 and 22 currently stands rejected under 35 U.S.C. §103(a) for allegedly being unpatentable over D'Arrigo, Keppeler, Plust and Mukerjee in view of U.S. Patent No. 6,057,051 to Uchida et al. (hereinafter "Uchida").

It is respectfully submitted that these rejections are moot since claims 1 and 14 from which claims 12 and 22 depend are patentable for at least the reasons as set forth above.

14. Claims 23 and 25 currently stand rejected under 35 U.S.C. §103(a) for allegedly being unpatentable over D'Arrigo, Keppeler, Plust, Mukerjee and Uchida in view of U.S. Patent No. 4,164,172 to Andersen et al. (hereinafter "Andersen").

It is respectfully submitted that these rejections are moot since claim 14 from which claims 23 and 25 depend is patentable for at least the reasons as set forth above.

15-16. Claims 1-3, 14 and 16 currently stand rejected on the grounds of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 4, 6, 11, 12 and 14-16 of U.S. Patent No. 7,422,816 to Erdler et al. (hereinafter "Erdler").

It is respectfully submitted that these rejections are now moot since claims 1 and 14 have been amended.

For all the foregoing reasons, reconsideration and allowance of claims 1-23 and 25 is respectfully requested.

If a telephone interview could assist in the prosecution of this application, please call the undersigned attorney.

Respectfully submitted,



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